The contribution of the homogenization in the extreme precipitation events

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The contribution of the homogenization in the extreme precipitation events

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Climate change is one of the great environmental concerns facing mankind in the twenty first century. The major changes are likely to occur in the global hydrological and energy balance. The greatest threat to humans will be manifested locally via changes in regional extreme weather and climate events. The society is particularly vulnerable to change in frequency and intensity of extreme events such as heavy precipitation, droughts and heat waves.
In this study we have analyzed the difference between the extreme precipitation events recorded by two independent networks present in the Piedmont region, North-Western Italy, during 15 years, from 1986 to 2003. Then we have evaluated the effects of the differences between the two Networks on the climate analysis. The first network considered is the Hydrographic Mareographic Italian Service (SIMN), the second the Regional Agency for Environmental Protection Piedmont (ARPA). In a first analysis we have selected on 55 pairs of meteorological stations only 20 pairs of stations with a long overlap period and a good continuity in the recorded of daily precipitation data. Successively we have analyzed if these pairs of stations have recorded the same extreme precipitation or an instrument overestimates or underestimates a particular rain event. An accurate statistical analysis to identify if the two series have the same statistical characteristics, same distribution, same mean, median, variance and so on, have been conducted.
We have calculated for every month and for every location the precipitation class using the percentiles. We have divided the rain event in four principles class (weak, moderate, heavy and extreme) and, for each one, we have calculated the number of events and the amount of rain and then we have compared the results between the two meteorological stations.
For the weak precipitation the major difference is estimated in the number of events and this divergence overestimates or underestimates the dry periods. For the moderate precipitation the major differences are in the amount of precipitation and in the number of events. This class seems influenced by other climatological elements for example the wind and snow and this require an accurate study to estimate the correction factors. For the heavy and extreme precipitation we have not identified great differences between the two series that falsify the behavior of the variables.